Green Power Marketing Conference

Philadelphia, Pennsylvania

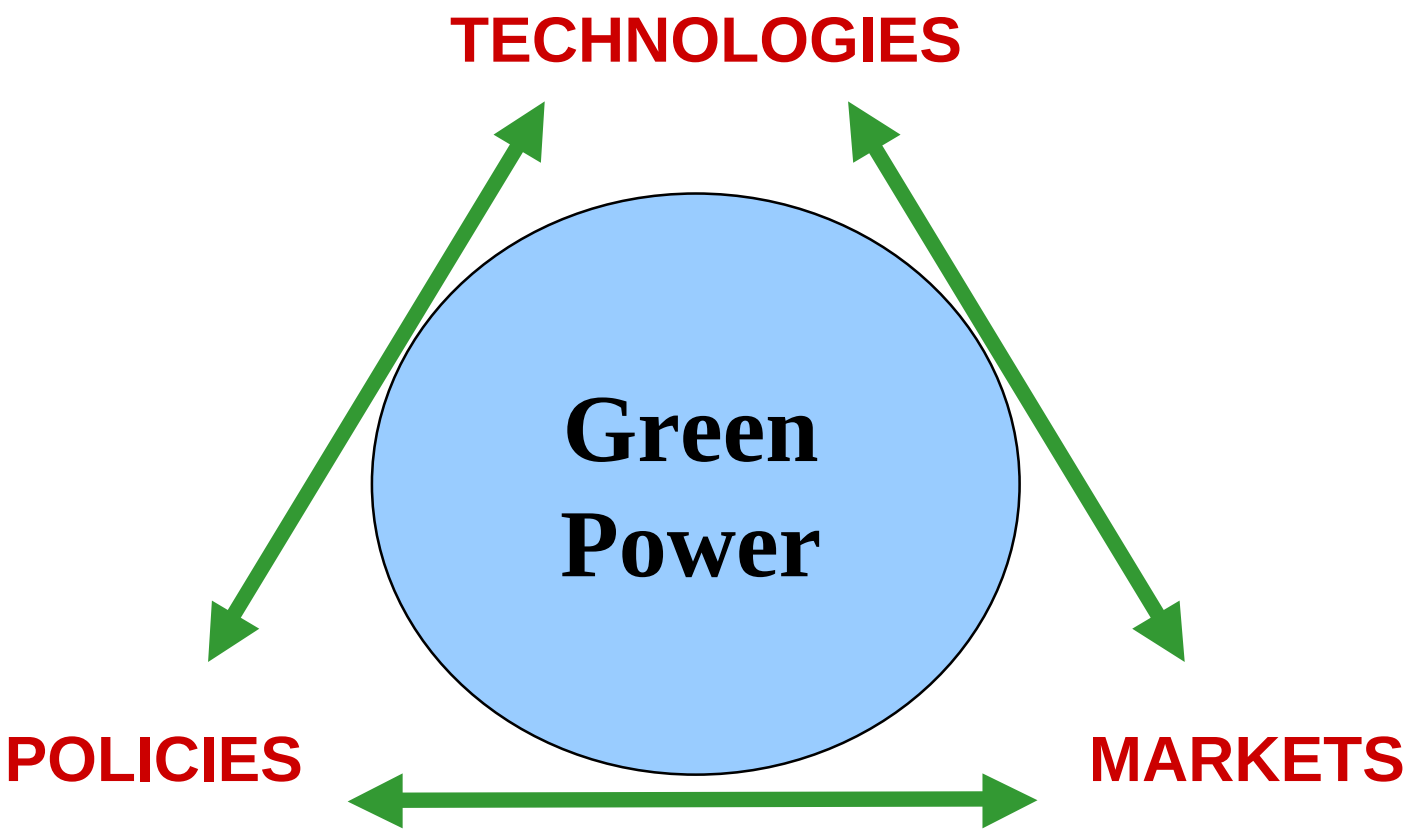
May 10, 1999

Dan Reicher
Assistant Secretary
U.S. Department of Energy

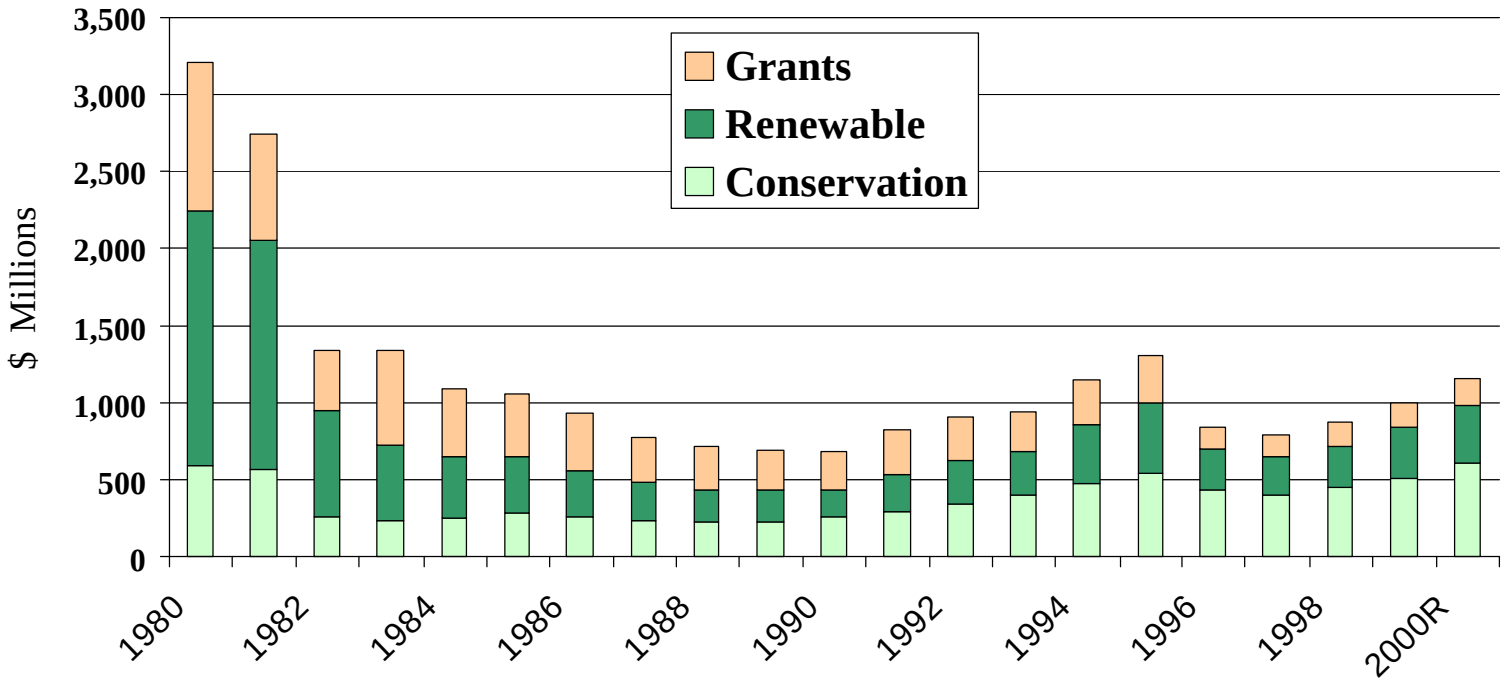
Key Drivers

- Energy Security
- Climate Change
- Air Emissions
- Electric Utility Restructuring
- Economic Competitiveness

The Elements Of Success



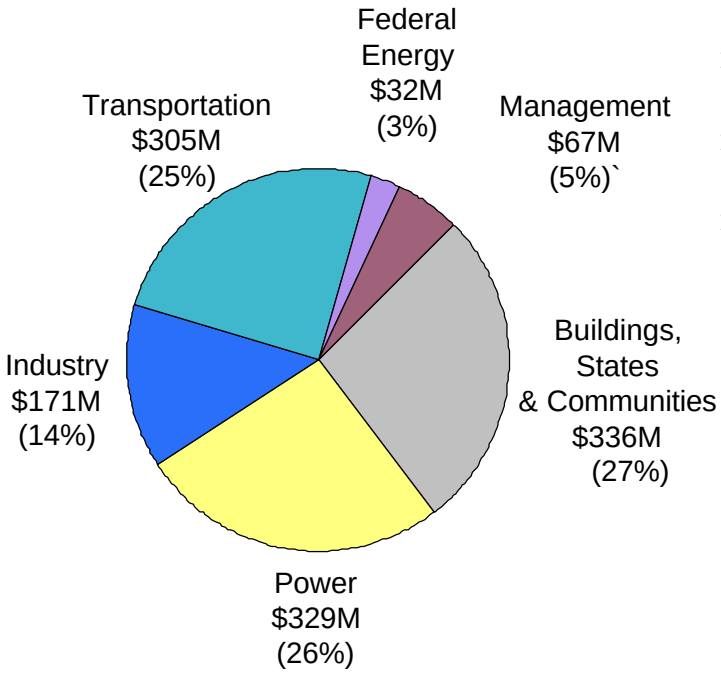
EERE Budget History 1980-2000

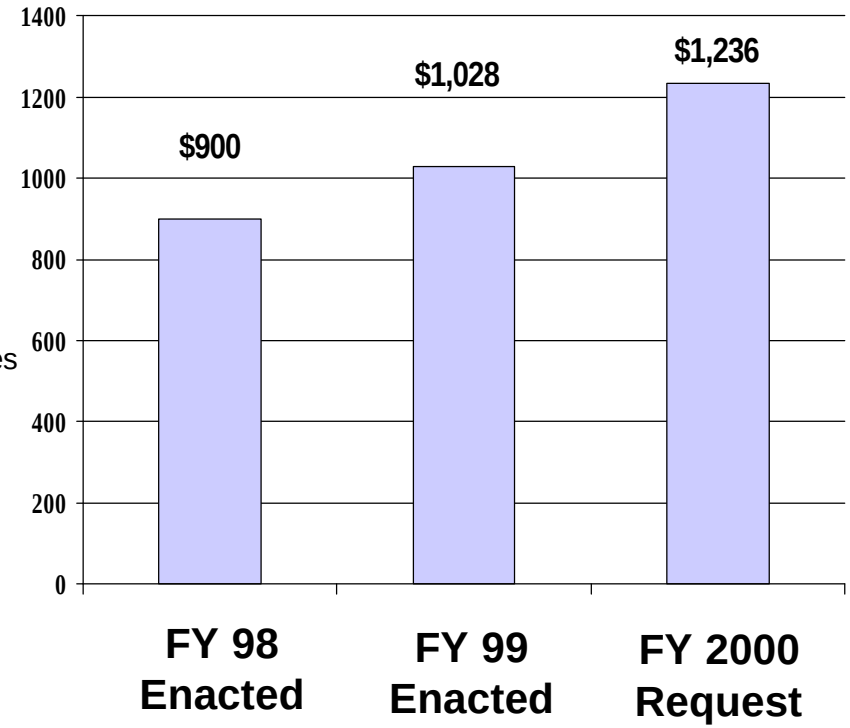


In constant 1998 dollars

EERE Budget Request $1.2 Billion

(millions of program dollars)





Office of Power Technologies
FY2000 Budget

	FY 1999 Enacted	FY 2000 Request
Renewable Power Technologies		
Photovoltaics	72.2	93.3
Solar Buildings	3.6	5.5
Concentrating Solar Power	17.0	18.9
Biopower	31.5	39.0
Geothermal	28.5	29.5
Wind	34.8	45.6
Hydropower	3.2	7.0
Power Delivery		
Superconductivity	32.5	31.0
Energy Storage	4.5	6.0
Hydrogen	22.3	28.0
Transmission Reliability	3.0	4.0
Cross-Program Activities		
Solar Program Support*	10.7	10.0
International/USIJI	9.0	9.6
REPI	4.0	1.5
Climate Challenge	0.1	0
Total (Rounded)**	277	329

* Activities conducted under other line items in 1999
** Does not include Solar Program Direction and NREL

- Develop new cells to capture 1/3 of sun's energy
- Pursue new concepts to cut costs in half
- Provide advanced trough technology for near term markets
- Co-fire with coal; develop modular power plant
- Launch new lab/industry partnerships for cost-cutting wind R&D breakthroughs
- Verify biological performance of fish-friendly turbines
- Install first-of-a-kind superconducting cable at Detroit Edison
- Demonstrate hydrogen fuel station for autos
- Develop real time electricity flow control devices
- Conduct restructuring analysis; cost share Native American and other projects

Technologies

- Wind
- Biomass
- Photovoltaics
- Concentrating Solar Power
- Geothermal
- Hydropower

Renewable Technologies

Wind Turbines

Solar Electric

Geothermal

Fuel Cells

World's First Residential Fuel Cell - Albany, New York

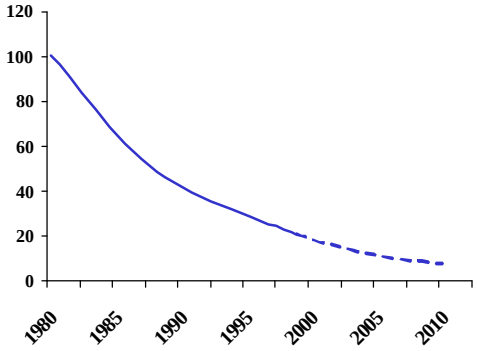
Buildings for the 21st Century

4 Times Square, New York City

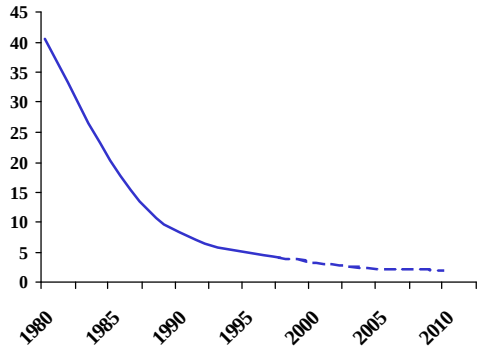
Carbone Home - Rochester, New York

Technology Accomplishments

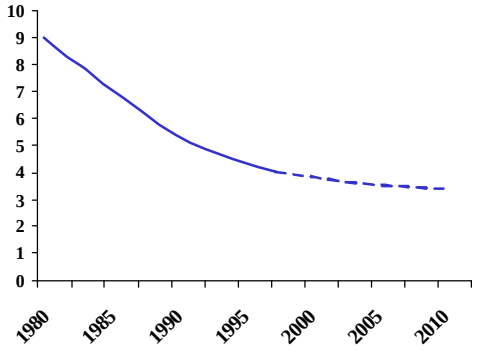
PV



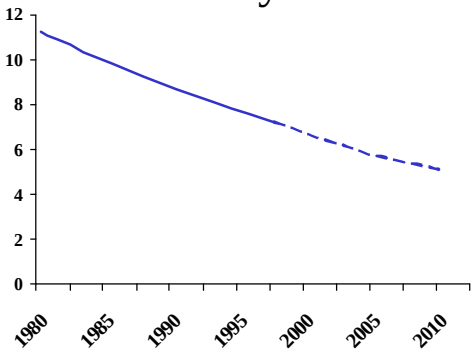
Wind



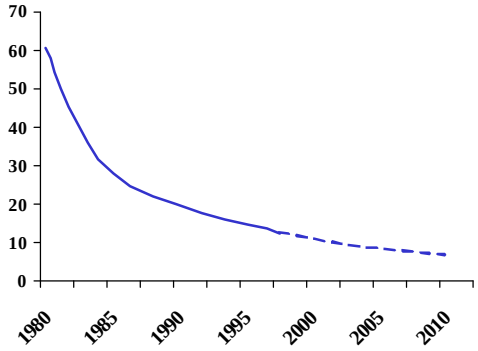
Geothermal



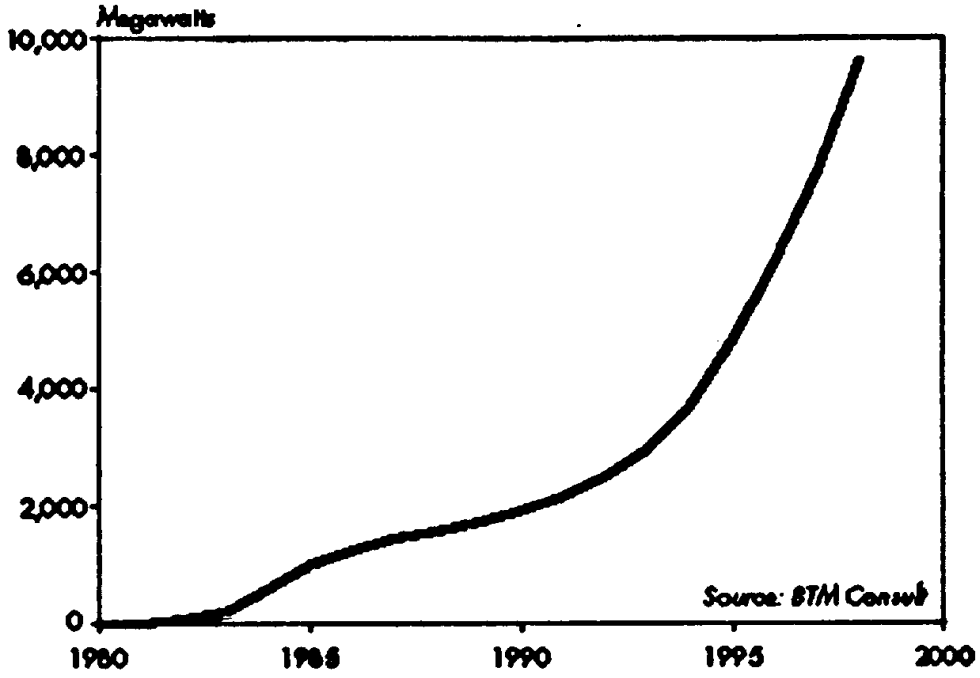
Biomass
Power Systems



Concentrating
Solar Power



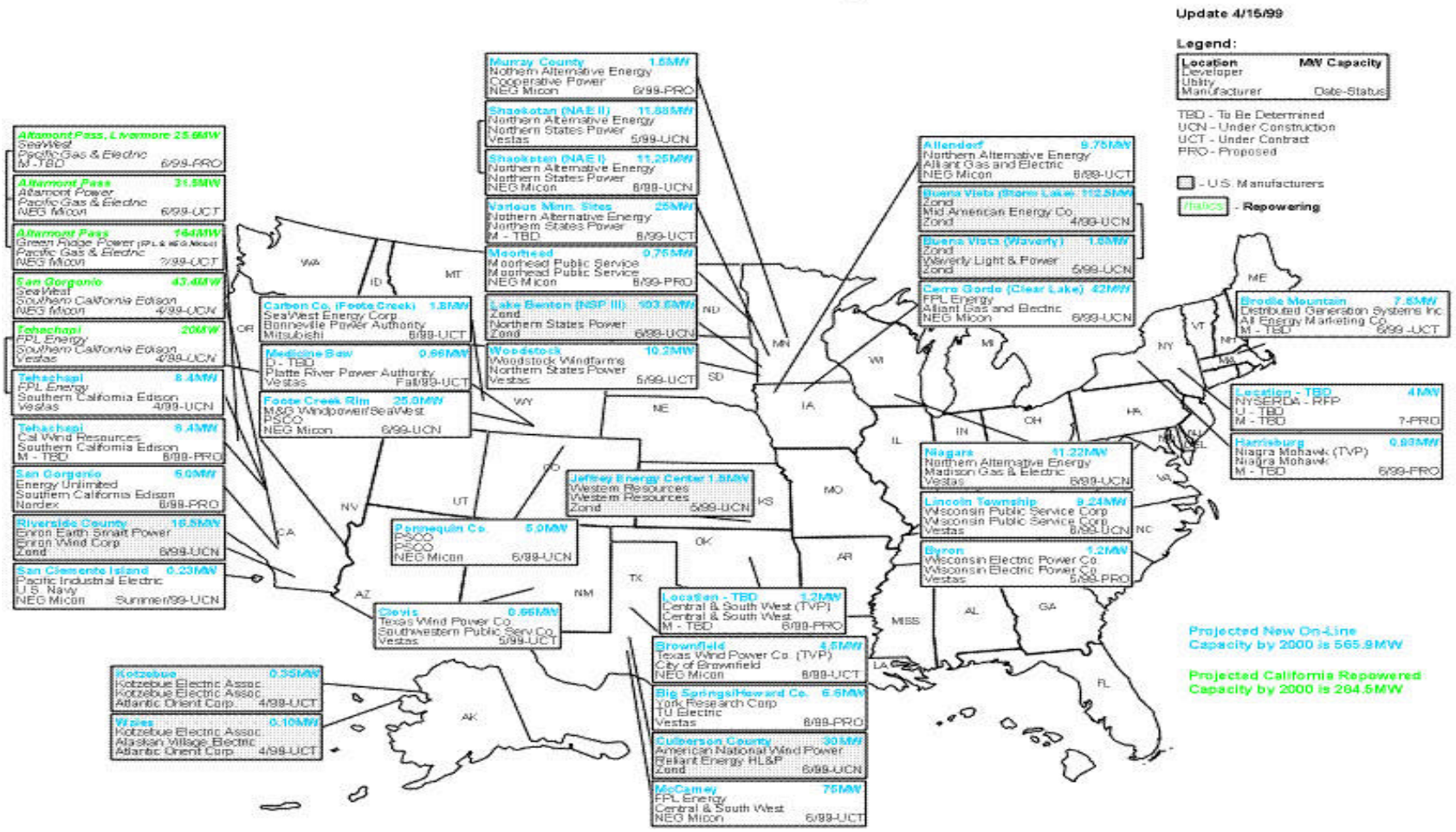
Wind



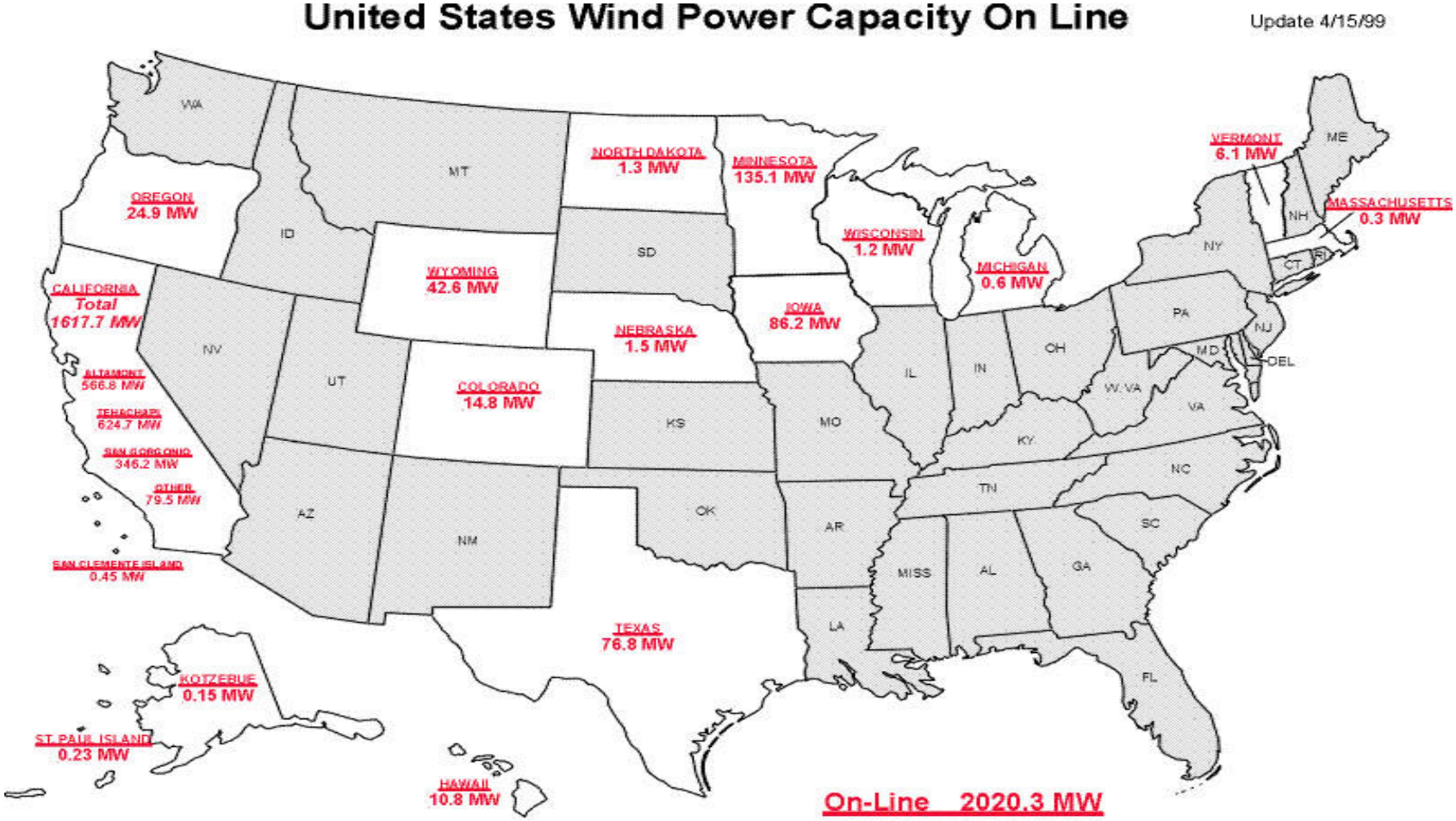
World Wind Energy Generating Capacity, 1980-98

Wind

United States Wind Power Projects for 1999

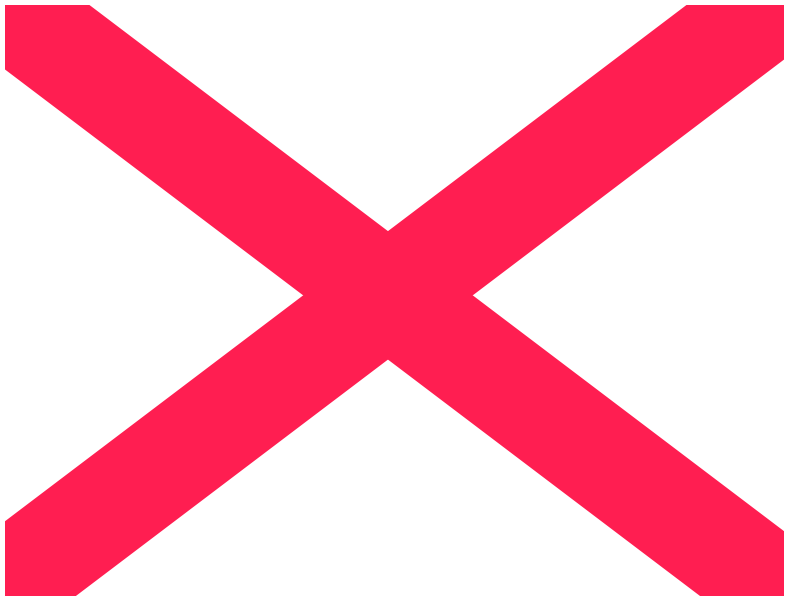


Wind


United States Wind Power Capacity On Line
Update 4/15/99
WA
OREGON
24.9 MW
CALIFORNIA
Total
1617.7 MW
ALTAMONT
566.8 MW
TEHACHAPI
624.7 MW
SAN GORGONIO
346.2 MW
OTHER
79.5 MW
SAN CLEMENTE ISLAND
0.45 MW
ID
NV
MT
WYOMING
42.6 MW
UT
AZ
CO
COLORADO
14.8 MW
NM
ND
NORTH DAKOTA
1.3 MW
SD
NEBRASKA
1.5 MW
KS
OK
TEXAS
76.8 MW
MN
MINNESOTA
135.1 MW
IA
IOWA
86.2 MW
MO
AR
LA
WI
WISCONSIN
1.2 MW
IL
MS
MI
MICHIGAN
0.6 MW
IN
KY
TN
AL
OH
WV
GA
FL
SC
NC
VA
PA
NY
VERMONT
6.1 MW
ME
NH
MASSACHUSETTS
0.3 MW
CT
RI
NJ
MD
DEL
KOTZEBUE
0.15 MW
ST. PAUL ISLAND
0.23 MW
HAWAII
10.8 MW
On-Line 2020.3 MW

Annual Capacity Additions since 1990

World Nuclear and Wind Power



Bringing It Home

Photovoltaics

▶ 01

SERVICE ADDRESS 8 HESKETH ST

TYPE OF BILL Actual Reading
Winter Rates In Effect

SERVICE PERIOD Mar 31 to Apr 29 1999 29 DAYS

METER NO. LAST DIGITS	MULTI-PLIER	METER READING PREVIOUS	METER READING PRESENT	KWH USED KW DEMAND*	DESCRIPTION	AMOUNT
NET2	1	911	956	45	Residential-R	
					First 45 KWH x $ .0507400	2.28
					Customer Charge	5.65
					Kilowatchers A/C - R RC	.00
					Fuel Rate at $.01672670 per KWH	.75
					Montgomery Co. Energy Tax at $.00106340 per KWH	.05
					MD Environmental Surcharge at $.00015000 per KWH	.01
					NET CURRENT BILL	8.74
					Prior Bill Amount	39.31
					Payments Through Apr 29	39.90CR
					TOTAL BALANCE FORWARD	.59CR
					PLEASE PAY THE AMOUNT NOW DUE	8.15

After May 20, 1999, a Late Payment Charge of $.12 will be added, increasing the amount due to $8.27.

Now is the perfect time of year to plant trees. Check out this month's issue of Lines for planting tips.

The scheduled meter read date for your next bill is May 26, 1999.

Period	Days	KWH-Used	Avg KWH per Day	% Change
May 98	29	270	9.3	
May 99	29	45	1.6	82.8-

SEE REVERSE SIDE FOR IMPORTANT INFORMATION *IF APPLICABLE PRINTED ON RECYCLED PAPER

Potomac Electric Power Company
P.O. Box 97274, Washington, DC 20090-7274 Telephone (202) 833-7500

Distributed Power Technologies

- **Photovoltaics**
- **Wind**
- **Fuel Cells**
- **Small Natural Gas-Fired Generation**
- **Modular Biomass**
- **Combined Heat and Power**
- **Energy Storage**
- **Smart Control Technologies**

Distributed Power Technologies

Residential Fuel Cell

50kW Microturbine

Photovoltaics at 4 Times Square

Small Wind Turbine

The Bioenergy Initiative:
Growing an Integrated Bioenergy Industry

The Bioenergy Initiative is a national partnership to develop an integrated industry to produce power, fuels, and chemicals from crops, trees, and wastes.

"The Bioenergy Initiative will help power America by using our most abundant natural resource-- biomass. By making a "ton of biomass" a viable market competitor to a barrel of imported oil, the Bioenergy Initiative will help strengthen U.S. energy security, protect the environment, reduce greenhouse gas emissions, and revitalize rural America."

DOE-Industry Bioenergy Meetings

- Agricultural Research Institute
- Archer Daniel Midlands
- ASERTTI
- BC International Corporation
- BD Technologies
- BF Goodrich
- BP Amoco
- Carbona Corporation
- Cargill
- Catalytica Combustion Systems, Inc.
- Champion International Corporation
- Corn Refiners Association
- Dow Chemical
- DTE Biomass Services, Inc.
- DuPont Corporation
- Enron Capital and Trade, Inc.
- Environmental and Energy Study Institute
- Future Energy Resources Corporation
- General Electric
- Georgia-Pacific Corporation
- Grain Processing Corporation
- Institute for Local Self Reliance
- Monsanto
- NASEO
- National Biodiesel Board
- National Corn Growers Association
- Natural Resources Defense Council
- Niagara Mohawk Power Corporation
- NIPSCO, Inc.
- Northern States Power Corporation
- NYSERDA
- Reflective Energies, Inc.
- Renewable Fuels Association
- Shell Oil Company
- Southern Company
- STM Corporation
- Tennessee Valley Authority
- Trigen Biopower Inc
- Union of Concerned Scientists
- United Soybean Board
- Weyerhauser Company
- Williams Energy Services

Biomass

- Direct Fire
- Co-Firing
- Gasification

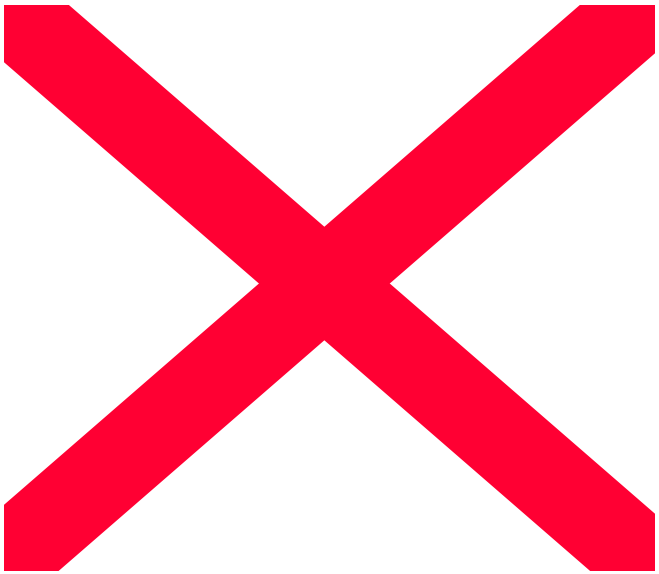
Co-Firing

- Field validate biomass co-firing using the least cost approach
- Broaden the base of utilities employing co-firing in existing generating units
- Increase the number and type of technologies used in co-firing

Combined Heat and Power

Malden Mills/CHP

Million Solar Roofs



Green Power

•Experience in four states with retail competition: California, Pennsylvania, Massachusetts and Rhode Island

•Nine suppliers offering 20 green products

– 14 products specify 100% renewables content; another 5 guarantee at least 50% renewables

– Nine of these offerings promise some **new** renewables

•Rates vary from a 3.47 cents/kWh premium over

1999 utility rates to a 0.2 cents/kWh discount

Green Power

Table 1. Environmental Characteristics of Products Offered in Pilots and Full Competition

Product Content	Retail Pilot Programs (NH, MA, OR)	Full Retail Competition (CA, MA, RI, PA)
Total number of green products offered to residential consumers	11	20
Percent of green products differentiated based on resource content	55%	100%
Percent of green products with 50% or more renewables content (including large hydro)	36%	95%
Percent of green products with 50% or more "eligible renewables" content (biomass, wind, small hydro, geothermal, solar)*	9%	85%
Percent of green products that include a commitment to supply some new renewables	9%	60%

*It is assumed that the hydro-based products in the New Hampshire and Massachusetts pilots consist primarily of large hydro resources.

California

- Retail choice on 3/31/98
- Seven electric service providers certified to use Green-e logo
- Limited price competition
- Overall switching is low
  - 87,000 (about 1% of residential customers after 1 year
  - nearly every switcher is served green power because of renewable energy credit
  - 50% of switchers pay more for green power
- Policy support includes: system benefit charge, information disclosure and consumer education

Pennsylvania

- Retail choice on 1/1/99
- Three green power suppliers
- “Shopping credit provides price competition
- Overall switching is higher
  - 378,000 customers (7.5% of those eligible) switched in first 2 months
  - About 80,000 of these switched to green power provider
- Policy support includes: renewables requirement for default providers; sustainable energy fund and aggressive consumer education

Massachusetts and Rhode Island

- Retail choice in early 1998
- Only one provider is offering green power
- Limited price competition
- Very few customers have switched
- Policy support:
  - Massachusetts: Renewables portfolio standard, system benefit charge, information disclosure
  - Rhode Island: System benefit charge

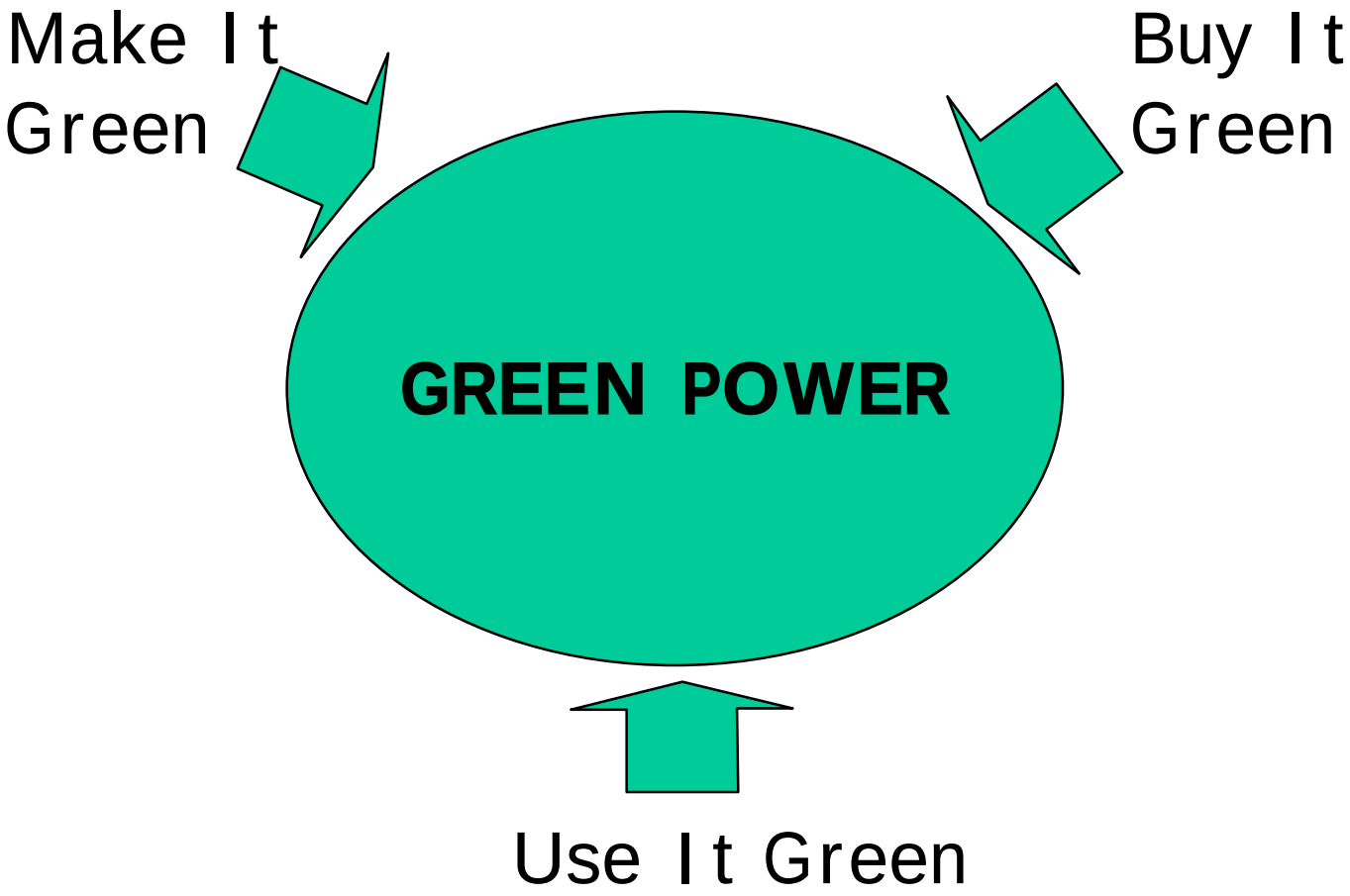
Green Power Strategy

- Robust competitive markets are essential
  - Market rules and default generation price must stimulate competition
  - Competition promotes innovation in products and business models
  - Consumer education is also critical
- Public policies should complement and support competitive markets for green power
  - Disclosure requirements, incentives, renewable portfolio standards

Policies

- Restructuring
- Clean Air Regulation
- Climate Change

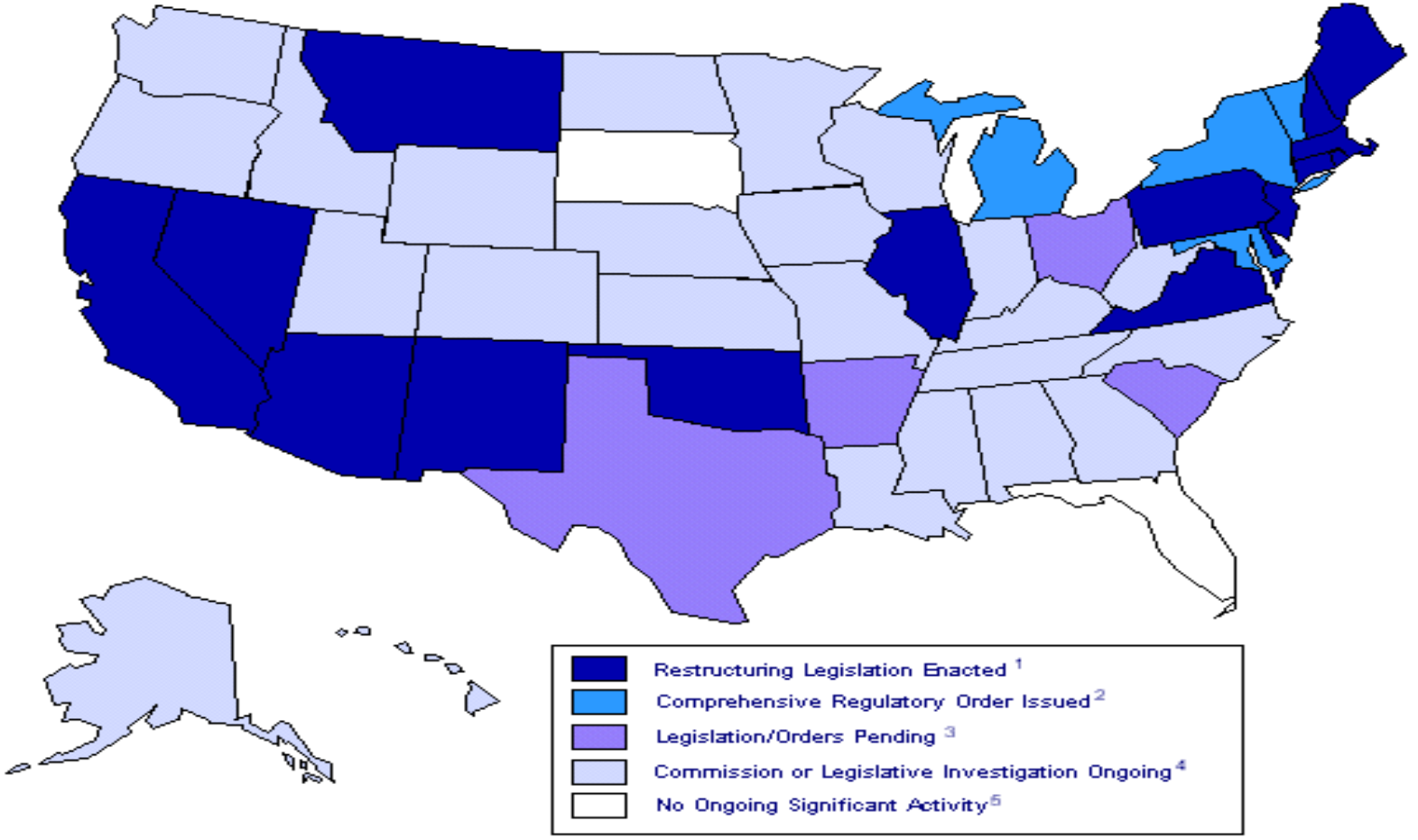
Putting It All Together



1999 Comprehensive Electricity Competition Plan

- **Flexible requirement for retail competition by January 1, 2003**
- **Amends PURPA to allow customer aggregation**
- **Improved Consumer Disclosure**
- **7.5% Renewable Portfolio Standard with tradable credits**
- **$3 Billion Public Benefit Fund**
- **Interconnection Standards**
- **Net Metering**

Restructuring



Climate Change Technology Initiative

$3.6 Billion in Tax Incentives

- **Efficient Homes and Buildings**
  - **-- Equipment**
  - **-- Homes**
  - **-- Rooftop Solar Energy Systems**
- **Efficient Vehicles**
- **Renewables**
  - **-- Wind**
  - **-- Biomass**
- **Combined Heat/Power for Industry**

NOx Set-Aside

- Cutting NOx Cost-Effectively through Efficiency and Renewables
- EPA Set-Aside Guidance:
  - -- 5-15% of NOx allowances for efficiency & renewable
  - -- must displace NOx that is part of state allocation
  - -- must exceed federally required reductions
- Guidance Issued in March 1999

NOx Set-Aside

Annual Benefits of 5% Set-Aside in 2003:

- Reduction in annual electricity demand of 90BKwH in 22 Eastern States & DC;

- $5 Billion in savings to customers;

- $150 Million in compliance cost savings;

- 20,000 new jobs

(EPA Estimates)

NOx Set-Aside

Market Opportunities:

- **Driver for Clean, Green Power**
- **NOx Credits worth $1000-1500 per ton**
- **Credit Aggregators Needed**

Market Transformation

- Million Solar Roofs
- Bioenergy Initiative
- Federal Government Procurement
- New Federal Actions

Markets

- Deployment Programs
- Incentives
- Federal Government Procurement
- Green Power

Federal Government as Consumer

- $200 billion annually on products and services
- $8 billion on federal energy bill
- 500,000 buildings
- Consumes 2% of nation’s electricity

Federal Actions Under Consideration

- Set new goals for greenhouse gas reductions and energy efficiency at Federal facilities
- Expand use of Energy Savings Performance Contracts and utility agreements to meet these goals
- Construct sustainable buildings
- Purchase green power
- Use renewable energy technologies
- Increase fuel efficiency of Federal fleet

The Lesson We've Learned...

…It takes all kinds of change to transform a market:

- advance technologies
- promote smart policies
- remove barriers
- build markets
- customer focus
- expand partnerships